

Psychological Needs and Motivations of Older Adults in Video Games

Kai Arcos Jiménez
Dyson School of Design Engineering
Imperial College London
London, England
k.arcosjimenez@gmail.com
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Rafael A. Calvo
Dyson School of Design Engineering
Imperial College London
London, England
r.calvo@imperial.ac.uk

Abstract— Two studies, one experimental and one survey-based, investigate the preferences and motivations of older adults in video games as compared to those of younger players. It was hypothesised that adults aged 50 and over would dislike violent video game content, while younger adults would feel more positively about it. Additionally, we hypothesised that older adults may have a negative perception of video games which prevents them from adopting this form of media. Results from the experimental study showed that controls play a big part in the player’s experience. In addition, participants found the violent game less enjoyable, but no statistically significant relationships between preference and age were found due to the limited sample size. Results from the video game adoption survey confirmed that older adults are more likely to perceive video games to be too violent. However, preconceived ideas were more tightly related to frequency of play than age. In addition, feelings of competence decreased as age increased. There were no statistically significant relationships between reasons for adoption or rejection and age, however some interesting trends were identified. Discussion focuses on providing a number of insights and suggestions for video game developers to consider when targeting this market segment. The limitations of the studies and opportunities for further research are also discussed.

Keywords— video games, motivation, autonomy, competence, preference, older adults

I. INTRODUCTION

Audrey Buchanan was 88 when she made headlines for her impressive play time of more than 3,500 hours in *Animal Crossing: New Leaf*. In a YouTube video, she takes us on a journey around her virtual village and introduces us to her favourite neighbours. In 2020, ‘Gamer Grandma’ Mori Hamako was recognised as the oldest gaming YouTuber by Guinness World Records at 90 years old. Her YouTube channel has amassed almost 500,000 subscribers who share her passion for action and RPG video games. Though reading stories such as these may be surprising to most of us, almost 50% of Americans aged 50 and over play video games regularly [1]. Over the past three years, the market for video games targeting older adults has been steadily growing [1], however very little has been done to define their motivations for playing and their tastes. This lack of user research results in video games targeted at older adults which do not properly address their motivations, needs and preferences, and therefore are not well-received. This not only hinders the targeting of this demographic from a sales perspective, but prevents the creation of video games which support healthy engagement and wellbeing among this group of users. Moreover, it may drive older adults to close the doors on a highly interactive form of entertainment which has been proven to entail positive effects on age-declining abilities and promote social interaction.

Therefore, this study aimed to define the tastes of older adults, find whether they differ from those of younger players, and identify their opinions on video games. Based on the study outcomes, we produced a series of insights and recommendations that will help video game designers to properly target this demographic in the future. As a result, we hope to see video games which promote healthy engagement and contribute to the wellbeing of older adults through the satisfaction of the three basic psychological needs of autonomy, competence, and relatedness. Lastly, we hope that the surge in these video games will encourage older adults to embrace a more interactive form of entertainment which entails positive effects on their social and cognitive abilities and wellbeing.

In order to identify opportunities for research that could inform the design of new games targeted at adults over 50 years old, we conducted a review of the current literature. The literature review contained papers relating to video game engagement and motivation, benefits of video game play, effects on wellbeing, and the relationship between older adults and video games. This paper contains a shortened and comprehensive version of it. The methodologies utilised in the studies described in this paper were also informed by the literature review. After concluding the studies, we analysed and interpreted the findings in order to establish a number of video game design insights and suggestions. These are the focus of the discussion found in this paper, in which we also discuss the limitations of the study and opportunities for further research arising from our insights. Finally, the main findings and points are summarised in the conclusion.

II. BACKGROUND

Prior research related to the psychology of video games focuses mostly on investigating the origins of motivation for video game play in general, with no regards to demographic differences. The research surrounding this topic is very extensive and has resulted in multiple player taxonomies, classifications, and motivation models. Building on Self-Determination Theory (SDT) [2], Ryan, Rigby and Przybylski [3] developed the *Player Experience of Need Satisfaction (PENS)* scale and found that satisfaction of the three basic psychological needs in video games is tied to motivation, preference for future play, and wellbeing. SDT defines these basic psychological needs as autonomy (a sense of willingness when doing a task), competence (a sense of feeling able and effective), and relatedness (a sense of belonging). These findings were further validated by Peng, Lin, Pfeiffer, and Winn [4] through an experimental study relating in-game features and psychological need satisfaction. The development of the *PENS* scale was the first research effort to focus on defining a motivation system that worked for all players, rather than classifying them based on their motivations. However, there were no participants over the age of 44, which makes it impossible to know whether the results

can be generalised to them. Older adults may have different ways of satisfying their needs, and therefore may feel motivated by different aspects of the game.

Another extensive field of research is the impact of video games on both physical and mental health. Numerous studies have proven the positive effects of playing video games on age-declining abilities, such as cognition and spatial skills [5]–[7]. In addition, many studies have proven positive effects to wellbeing [8], and that social interactions taking place in a virtual environment can translate to real life social interactions in a positive way [9]. These studies have led to fascinating findings which highlight the potential of video games as tools to maintain and improve abilities and wellbeing.

The research regarding the specific motivations and tastes of adults aged 50 and over is scarce. It is clear that older adults are underrepresented in research relating to video game play for the sake of play itself, with study samples usually only including young adults. De Schutter and Vanden Abeele [10] investigated the preferences of the elderly in video games through participatory design sessions in 2008. This study allowed them to obtain interesting insights about preferred content, however the findings cannot be said to represent the general older adult population as the sample only included 10 Flemish participants who were consciously selected to be active and engaged members in their communities.

From the literature review, it became clear that there exists a gap in research surrounding older adults' video game preferences. Most research efforts are put towards health and age-declining abilities. This might stem from the preconceived idea that older adults exclusively play video games to maintain such abilities. This, however, contradicts findings which show that 76% of older adults play simply for fun [1]. Moreover, there has been extensive research surrounding video game play motivation in general, but none of it investigates that of adults over 50 years old. Older adults' opinions and ideas about video games and what prevents them from adopting them are also yet to be investigated.

Therefore, with the objective of investigating older adults' tastes, we defined two hypotheses. The first one is that older adults have different preferences when it comes to video game content. More specifically, we hypothesised that they would prefer nonviolent over violent video game content, and this would differ from younger players. The second hypothesis is that older adults sometimes have negative preconceived ideas about video games which prevent them from adopting this form of entertainment. Through proving or disproving these hypotheses, we expected to find whether the preferences of adults aged 50 and over differ from those of younger adults. Additionally, we hoped to gain insights on this demographic's opinions on video games.

III. STUDY I

A. Methodology

We conducted a survey-based study assessing people's motivations for either adopting or rejecting video games as a form of entertainment, as well as their perception of video games, in order to observe the relationship between these variables and age, gender, and frequency of play. Participants were asked to provide this information, and then express their agreement with a number of statements that explored their reasons for adoption or rejection, their feelings of competence, and their perception of video games. The survey was

distributed through personal contacts and video game related online communities, and obtained a total of 145 responses, with 106 of these being complete. As variables such as reasons for adoption or rejection, feelings of competence, and perception were analysed separately from each other, the remaining 39 partial responses were considered to be valid data and were analysed along with the complete responses. The distribution of the participants' ages can be seen in Fig. 1. We obtained an almost equal number of responses from people aged under 50 and older adults.

The items relating to reasons for adoption or rejection would display based on the participant's answer to the question "Do you play video games?". Those who answered "Never" were asked about their motivations for not playing, whereas participants who answered that they played video games were asked about their reasons for beginning to do so. The objective was to identify any reasons for rejection or adoption that might be common in older adults, as well as differences between them and those of younger participants. The section assessing participants' perception of video games asked them to express their agreement with a number of statements based on common preconceptions and proven facts about video games. The aim was to observe whether negative and positive perceptions were tied to age or frequency of play.

B. Measures

1) *Autonomy and Competence in Technology Adoption (ACTA)* [11]. This questionnaire studies why people choose to adopt a technology. The questionnaire used in this study has been adapted to identify video games as the technology in question, and to add reasons for rejection. Participants were asked to reflect on a number of statements relating to their reasons for rejection or adoption and answer on a 5-point Likert scale. The *Adoption* scale included 12 items such as "Other people want me to play them.", "Video games are fun to play.", and "Video games would be of value to me in my life.". The *Rejection* scale was based on the *Adoption* scale, but also included common reasons for rejection found through discussions in video game related communities. It includes 8 items such as "Video games are boring to play.", "There are no video games out there that I would enjoy.", and "It would look bad to others if I played them". The *ACTA* scale also includes a *Perceived Competence* subscale with two items; "I feel confident that I'll be able to play video games effectively.", and "Video games will be easy for me to play".

2) *Preconceived ideas*: Participants were also asked to agree or disagree with several statements related to their perception of video games. There were 10 statements, including a mix of common preconceived ideas and facts, such as "Video games are too violent.", "Video games can improve your wellbeing.", and "Video games are isolating."

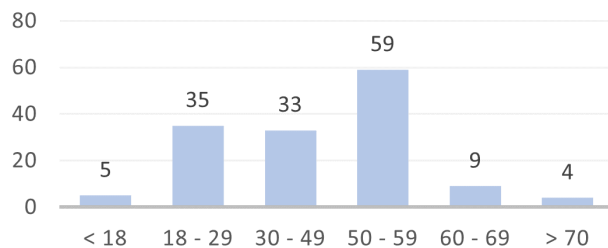


Fig. 1. Age distribution of survey respondents.

C. Preliminary results

We first tested for effects of age and gender in adoption rates through a Chi-squared statistic test. We found that age had a major effect ($p < 0.01$), and that people aged 50 and over reported playing video games less often, if at all. Gender also had an effect on frequency of play ($p < 0.01$), with females reporting lower adoption rates. These relations can be observed in detail in *Appendix A*.

D. Primary results

The score representing feelings of competence was obtained by averaging participants' responses to the *Perceived Competence* subscale of the *ACTA* questionnaire. We tested for effects of age and frequency of play in feelings of competence, and found that age had a significant effect on people who play video games regularly ($p < 0.10$), but not on non-players. Additionally, the scores of non-players were significantly lower.

In order to investigate differences in perception, we tested for the effects of both age and frequency of play on participants' agreement with the statements presented. We found that the only statement affected by age was "Video games are too violent." ($p < 0.10$). Agreement with this statement increased with age, with a majority of participants aged 30 and over believing it to be at least somewhat true, and 25.6% of adults aged 50 to 59 reporting it to be very true. In contrast, only 3.4% of participants under 29 years old shared this opinion. In terms of frequency of play, we found significant results with three statements. Non-players were significantly more likely to agree with the statement "Video games are too violent." ($p < 0.01$). In contrast, no participants who played regularly (at least twice a week) found this statement very true. Regular players expressed higher agreement with the statement "Video games are popular." ($p < 0.01$), and they were also less likely to agree with the item "Video games are isolating" ($p < 0.01$). Based on the results, it appears that holding a negative or positive perception of video games is more tightly related to frequency of play and therefore familiarity with video games, rather than age.

There were no statistically significant findings regarding reasons for adoption or rejection. Answers were very varied across all age groups. However, we identified several trends. Participants aged 30 to 59 were more likely to adopt video games due to external pressure ("I feel or felt pressured to play them."). Most people play video games because they are fun to play, although adults aged 50 to 59 seemed to be more split on this statement. Adults aged 30 to 69 were more likely to reject video games because they believe that there are no options for them ("There are no video games out there that I would enjoy"). Interestingly, a majority of people across all age groups believed this to be at least somewhat true. The detailed relations between reasons for adoption or rejection and age can be found in *Appendix C*.

TABLE I. AVERAGE SCORES FOR FEELINGS OF COMPETENCE.

Age	Feelings of competence (score)	
	Players	Non-players
Average	3.57	2.58
Under 50	3.93	3.08
Over 50	2.49	1.93

TABLE II. RELATIONS BETWEEN PRECONCEIVED IDEAS, AGE AND FREQUENCY OF PLAY.

Questionnaire item ^a	p - Age	p - Frequency
"Video games are too violent."	< 0.10	< 0.01
"Video games are popular."	0.40	< 0.01
"Video games are isolating."	0.36	< 0.01

^a Only those with statistically significant relations. A complete crosstab is available in *Appendix B*.

IV. STUDY II

A. Methodology

The methods followed in Study II draw inspiration from Przybylski, Ryan, and Rigby [12], who conducted a series of studies investigating the motivating effects of violent video game content. One of these studies used two games differing in content to investigate if trait aggression of participants influenced their preference for future play. The study followed a crossover format, in which participants were randomly assigned to play a nonviolent or violent game and were presented questionnaires based on the *PENS* scale developed by Ryan, Rigby, and Przybylski [3] before and after a 20-minute play session. We aimed to recreate the study conditions to identify difference in preference for violent or nonviolent game content between adults aged 50 and over and adults aged under 30.

The participants were five young adults aged 18-29 and five older adults aged 50-69. They were recruited through personal contacts, as well as social media advertising of the study in video game related communities, and selected to have varying levels of familiarity with video games. Participants were split in two equally sized groups and randomly assigned a violent or nonviolent game to play for 10 minutes. A questionnaire based on the *PENS* scale developed by Ryan, Rigby, and Przybylski [3] and the *TENS-Interface* scale developed by Peters, Calvo, and Ryan [11] was presented to participants after the 10-minute play session. An open-ended optional question asking participants to share any other thoughts on the video game was also part of the survey. Participants were then asked to play the other game and complete the same questionnaire. A description of the study process can be seen in *Fig. 2*. Due to COVID-19, the crossover study was run as a series of individual Zoom sessions. A positive unexpected consequence of this format was the ability to observe each individual participant play the video games, which allowed us to gather their individual thoughts and witness their reactions.

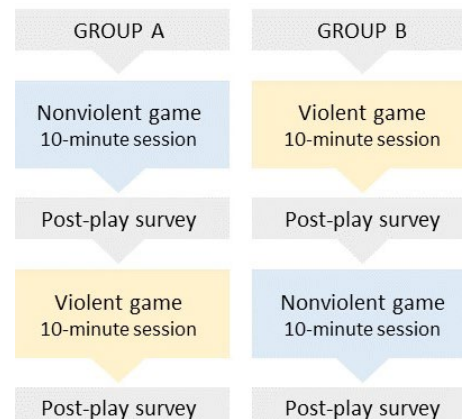


Fig. 2. Graphic representing the structure of the crossover study.

The violent option was a game called *Hell Sucker*, a top-down 2D shooter which consists of controlling a mosquito wanting to feed off demon blood, developed by *CheeseBaron2* [13]. In this game, players need to move the mosquito around while shooting demons which explode in blood. The player can then collect this blood to recover health and keep fighting. The nonviolent game was *Sushi Roll*, a clicker game in which the player controls a maki roll and prevents it from falling off an infinite table, developed by *Famobi* [14]. In this game, the player needs to change the rolling direction of the maki before it falls off the table, and collect coins along the way. Both games were chosen to be free to play and to require no download or installation in order to reduce the inconvenience for the participants and account for differences in familiarity with the technology required to do so. Participants were also provided a document with instructions and the links to the games and surveys. Both games follow a similar control scheme through the computer mouse. This aspect was given high priority when choosing the games, as it would minimise differences in preference relating to interface rather than content and reduce the inconvenience for participants less familiar with keyboard video game controls. Moreover, the play sessions were reduced from 20 to 10 minutes due to the repetitive nature of the video games and to minimise participant discomfort.

B. Measures

1) *Technology-based Experience of Need Satisfaction – Interface (TENS-Interface)* [11]. This scale is based on the *Player Experience of Need Satisfaction* scale developed by Ryan, Rigby, and Przybylski [3] and will be used after each play session as the *PENS* scale is currently not available. The *TENS-Interface* subscale for in-game autonomy consists of five items such as “I feel pressured by the game” and “The game provides interesting options and choices”. In-game competence is measured through a five-item subscale focusing on experiences of mastery, such as “I felt confident in my ability to play this game” and “I feel very capable and effective at playing this video game.”

2) *Enjoyment*: This aspect will be assessed with three items that have been adapted from the *Intrinsic Motivation Inventory* [15], including items such as “The video game was entertaining” and “I enjoyed playing the video game”.

3) *Preference*: This will be assessed with three items, such as “I would play this video game in my free time.” and “The video game suits my tastes.”.

C. Primary results

All scores for feelings of competence, feelings of autonomy, and game preference were obtained by averaging participants’ responses to the respective subscales of the post-play questionnaire. We then tested for effects of age on the variables of interest through a Chi-squared test.

Due to the limited sample size, no statistically significant results were obtained from the crossover study, therefore our hypothesis about older adults’ content preference cannot be proven or refuted. However, we were able to identify trends and obtain insights from the individual study sessions. Generally, *Hell Sucker* was perceived as a more difficult game, with feelings of competence decreasing as compared to *Sushi Roll*. Additionally, feelings of competence decreased

with age for both games, but especially so for *Hell Sucker*. Participants generally expressed frustration towards the game’s interface and controls during the sessions, and the item “I found the interface and controls confusing.” obtained the lowest score in adults over 50 compared to other competence items. Overall, controls seemed to have a bigger impact on participants’ perception of difficulty than we anticipated. Feelings of autonomy generally decreased when playing *Hell Sucker*. Participants reported this game being more intrusive, as well as feeling more pressured by it, with some mentioning its stress-inducing music and frustrating gameplay as the main factors. For participants under 50 years old, the average preference score stayed exactly the same for both games, while participants over 50 years old preferred *Sushi Roll*, expressing higher preference for future play and enjoyment.

V. DISCUSSION

A. Insights and suggestions for developers

While both studies allowed us to obtain insightful results, we have selected a small number of them to influence our suggestions to developers. We believe that further investigation is required to convert the remaining insights into design interventions. These are highlighted in section C of this discussion.

Crossover study findings highlighted the influence of the interface and controls in competence scores and game preference, especially in older adults. Many participants expressed feelings of frustration related to the difficulty of the controls during the one-on-one sessions when playing *Hell Sucker*. However, younger players were more likely to find the challenge motivating enough to keep trying to obtain a higher score, whereas older adults often expressed frustration and asked when they could move on. Complicated controls can be a high barrier of entry for older adults due to causing low feelings of competence, which can result in them rejecting the game. This is not only due to age-declining motor and cognitive abilities, but also because of having little to no experience with video games. From these insights, we determined that video games targeting older adults should include accessibility settings which account for the high barrier of entry. The Game Accessibility Guidelines, created by Ellis et al. [16], detail an extensive collection of accessibility settings that can be implemented in a video game. These guidelines group the settings by ease of implementation, and provide best practice examples and tools. Many of the older adults in Study II found the controls in *Hell Sucker* confusing, especially those not explained by the game itself (“How do I aim the gun?”). This leads us to believe that some of the basic accessibility options that could prove useful for older adults are: allowing controls to be remapped, providing simple alternatives to complicated or tiring gameplay mechanics, and including interactive tutorials. These, among many other potential changes detailed in the Game Accessibility Guidelines [16], would increase feelings of competence and autonomy among players and increase adoption rates, as well as being more inclusive towards everyone.

TABLE III. COMPETENCE, AUTONOMY, AND PREFERENCE SCORES FOR EACH GAME.

Age	Sushi Roll (nonviolent)			Hell Sucker (violent)		
	Competence	Autonomy	Preference	Competence	Autonomy	Preference
Average	3.62	3.10	3.19	2.88	2.38	2.13
Under 50	4.10	3.36	3.24	3.70	2.80	3.24
Over 50	2.94 ^b	2.68	3.60	3.06 ^b	2.13	3.15

^b. The responses of one adult older than 50 greatly impacted the competence results due to the small sample size, however the trend was that feelings of competence decreased when playing *Hell Sucker*.

Although *Sushi Roll* induced high feelings of competence, participants felt mostly neutral about playing it in the future. In contrast, *Hell Sucker* had low feelings of competence among both age groups and low preference for future play among older adults. During the crossover study, several participants mentioned *Sushi Roll* being very easy, while expressing frustration at *Hell Sucker*'s high level of difficulty. *Sushi Roll* might not have provided enough of a challenge to hook players, especially those familiar with video games, while *Hell Sucker* might have been too difficult to be adopted by inexperienced players. In addition, the video game adoption survey showed that feelings of competence decreased with age. We therefore determined that video games that aim to target a wide range of players, including older adults, would benefit from offering a wide choice of difficulty settings and the option to adjust these at any time. This would allow video game designers to satisfy both experienced and inexperienced players, increasing overall adoption rates. While many developers have adopted this format, it is a topic of discussion within the video game community [17], therefore it would be beneficial to explore subtle ways of implementing it. For example, rather than giving players the option to choose between 'Easy' and 'Hard' mode, there could be a gradual increase in difficulty. The difficulty could 'level up' once players reach certain milestones to account for the player getting familiar with the gameplay, with the option to revert one level if they find the new difficulty to be too challenging. Difficulty settings would not only increase adoption rates, but increase the player's feelings of competence, positively contributing to their wellbeing.

B. Limitations

In terms of limitations, we ought to highlight the limited sample size of the crossover study, which prevented us from finding any significant relations despite efforts made to recruit participants with different levels of familiarity with video games. The remote nature of the project due to COVID-19 hindered both the recruitment of participants and the management of the study. One-on-one sessions were chosen over distribution of instructions in order to ensure the adherence to the instructions and the quality of the data, which limited the number of participants. Therefore, the results from Study II cannot be generalised to the general population and further validation is needed.

A second limitation was the choice of games. While the control scheme was similar, there were differences which greatly impacted the results of the study. A recreation of this study would benefit from games which are the same in essence, and differ only in their varying levels of violent content. By following this method, differences in preference which stem from other factors such as interface or graphics can be prevented, allowing for the evaluation of preference for violent or nonviolent content in isolation.

Additionally, participant feedback on the adoption survey highlighted that the questions relating to 'reasons for starting play' rather than 'reasons for playing' might not do well with younger players. Many of them started playing very young and might not remember why they did so. It might have been more useful to ask about their reasons for continuing to play and not abandoning video games later in life. This experience may have been more comparable to that of older adults who picked up games as young adults or later.

C. Opportunities for further research

Throughout the duration of the study, we identified several opportunities for further research based on the results. One of the insights stemming from Study I was that a majority of people believe that there are no video games that they would enjoy. With the immense variety of video game genres, gameplay mechanics, and art styles that exist, this is highly unlikely. The fact that this belief is so widespread might have to do with a lack of awareness of all the different kinds of games that are available, and the video game industry would benefit from learning how to tackle the issue and disprove this belief. We believe that further research into this subject is required before an intervention can be designed.

There is another opportunity in investigating the origin of older adults' belief that video games are too violent. This may be a sign of a cultural shift relating to how violence is perceived and how much importance is attached to it. Could it be that young people are more familiarised with violent content nowadays? Or is it something to do purely with older adults being unaware of the high number of nonviolent video game options that exist? In this case, the origin could be in how video games are presented in media, or the marketing used to promote them. We believe that this area of research may yield very interesting results that could be utilised to influence how video games are promoted to different audiences.

VI. CONCLUSION

This project consisted of two different studies, one survey-based and one experimental. The first investigated reasons for adoption or rejection, feelings of competence, and perception of video games. We achieved a large sample size of 145 participants and obtained significant findings relating to participants' ideas of video games, which allowed us to draw various insights. The second study aimed to investigate older adults' preference for violent or nonviolent video game content, as compared to that of younger players. The sample size was of 10 participants who participated on one-on-one sessions. No significant findings were obtained; however a number of trends were identified, and we were able to define several insights. The main limitations of the project were related to COVID-19 impacting the participant recruitment process, resulting in a small sample size for Study II.

A number of opportunities for further research arose from the findings obtained from Study I, such as investigating the origin of the belief that video games are too violent. We believe that further research relating to the psychology of video games and the public's perception of this form of media would be extremely beneficial to the industry, as well as its consumers. Understanding the consumer allows for the design of video games which are well received and contribute to the satisfaction of the three basic psychological needs of autonomy, competence, and relatedness.

Although we were unable to prove or refute the hypothesis that older adults would prefer nonviolent content through Study II, we obtained a number of insights to inform design choices that will help developers increase adoption rates among this demographic. The identified design features are: the addition of accessibility settings aimed at reducing the barrier of entry for inexperienced and older players, and the implementation of subtle difficulty settings which satisfy a wide range of familiarity levels. These measures will increase feelings of competence among players, which we found to be an influential factor in video game preference and enjoyment. It must be noted that these recommendations will not only increase adoption rates among adults aged 50 and over, but also the general public, due to their inclusive nature. While many developers are now adopting these measures, there is still room for improvement in the area of inclusivity and accessibility in video games. We hope for a future in which accessibility settings are a given within the industry, and everyone can enjoy this highly interactive and rewarding form of media.

VII. REFERENCES

- [1] B. Nelson-Kakulla, "Gaming Trends of the 50+," *AARP Res.*, no. December, pp. 1–48, 2019.
- [2] E. L. Deci and R. M. Ryan, "Self-determination theory.," in *Handbook of theories of social psychology, Vol. 1*, Thousand Oaks, CA: Sage Publications Ltd, 2012, pp. 416–436.
- [3] [R. M. Ryan, C. S. Rigby, and A. Przybylski, "The Motivational Pull of Video Games: A Self-Determination Theory Approach," *Motiv. Emot.*, vol. 30, no. 4, pp. 344–360, 2006.
- [4] W. Peng, J.-H. Lin, K. A. Pfeiffer, and B. Winn, "Need Satisfaction Supportive Game Features as Motivational Determinants: An Experimental Study of a Self-Determination Theory Guided Exergame," *Media Psychol.*, vol. 15, no. 2, pp. 175–196, May 2012.
- [5] S. Ballesteros *et al.*, "Brain training with non-action video games enhances aspects of cognition in older adults: a randomized controlled trial," *Front. Aging Neurosci.*, vol. 6, p. 277, 2014.
- [6] A. C. S. Torres, "Cognitive effects of video games on old people," *Int. J. Disabil. Hum. Dev.*, vol. 10, no. 1, 2011.
- [7] G. L. West *et al.*, "Playing Super Mario 64 increases hippocampal grey matter in older adults," *PLoS One*, vol. 12, no. 12, p. e0187779, Dec. 2017.
- [8] K. Vella, D. Johnson, and L. Hides, "Positively Playful: When Videogames Lead to Player Wellbeing," in *Proceedings of the First International Conference on Gameful Design, Research, and Applications*, 2013, pp. 99–102.
- [9] L. Molyneux, K. Vasudevan, and H. Gil de Zúñiga, "Gaming Social Capital: Exploring Civic Value in Multiplayer Video Games," *J. Comput. Commun.*, vol. 20, no. 4, pp. 381–399, Jul. 2015.
- [10] B. De Schutter and V. Vanden Abeele, "Meaningful Play in Elderly Life." 2008.
- [11] D. Peters, R. A. Calvo, and R. M. Ryan, "Designing for Motivation, Engagement and Wellbeing in Digital Experience," *Front. Psychol.*, vol. 9, p. 797, 2018.
- [12] A. K. Przybylski, R. M. Ryan, and C. S. Rigby, "The Motivating Role of Violence in Video Games," *Pers. Soc. Psychol. Bull.*, vol. 35, no. 2, pp. 243–259, 2009.

- [13] CheeseBaron2, "Hell Sucker," 2021. [Online]. Available: <https://itch.io/jam/blackthornprod-game-jam-3/rate/893382>.
- [14] Famobi, "Sushi Roll." [Online]. Available: <https://play.famobi.com/sushi-roll>.
- [15] E. McAuley, T. Duncan, and V. V. Tammen, "Psychometric Properties of the Intrinsic Motivation Inventory in a Competitive Sport Setting: A Confirmatory Factor Analysis," *Res. Q. Exerc. Sport*, vol. 60, no. 1, pp. 48–58, Mar. 1989.
- [16] B. Ellis *et al.*, "Game Accessibility Guidelines." [Online]. Available: <http://gameaccessibilityguidelines.com/>. [Accessed: 18-May-2021].
- [17] D. Allen, "Easy Mode vs. The Cult of Difficulty in Gaming," *The Nerd Daily*, 2020. [Online]. Available: <https://thenerdaily.com/easy-mode-vs-the-cult-of-difficulty-in-gaming/>. [Accessed: 28-May-2021].

VIII. APPENDIX

A. Study I: Demographics vs. Frequency of Play

TABLE IV. RESPONSES TO QUESTION "DO YOU PLAY VIDEO GAMES?" (IN PERCENTAGES).

Frequency	Age					
	< 18	18 - 29	30 - 49	50 - 59	60 - 69	> 70
Never	40.0	22.9	48.5	78.0	77.8	75.0
Twice a month	0.0	11.4	21.2	13.6	22.2	0.0
Twice a week	0.0	17.1	9.1	3.4	0.0	0.0
Three or more times a week	60.0	48.6	21.2	5.1	0.0	25

TABLE V. RESPONSES TO QUESTION "DO YOU PLAY VIDEO GAMES?" (IN PERCENTAGES).

Frequency	Gender			
	Male	Female	Non-binary	Not disclosed
Never	45.3	67.4	0.0	0.0
Twice a month	7.5	18.6	0.0	25.0
Twice a week	13.2	3.5	50.0	0.0
Three or more times a week	34.0	10.5	50.0	75.0

TABLE VI. RELATIONS BETWEEN DEMOGRAPHICS AND FREQUENCY OF PLAY.

Variable	p - Age	p - Gender
Frequency of play	< 0.001	< 0.001

(Appendix continued in next page.)

B. Study I: Preconceived Ideas

TABLE VII. RELATIONS BETWEEN PRECONCEIVED IDEAS, AGE AND FREQUENCY.

Questionnaire item	<i>p</i> - Age	<i>p</i> - Frequency
“Video games are too violent.”	< 0.10 ^c	< 0.01 ^c
“Video games can have a negative impact on your life.”	0.05	0.23
“Video games are for people younger than me.”	0.58	0.13
“Video games are for men.”	0.91	0.50
“Video games are popular.”	0.40	< 0.01 ^c
“Older people can also play video games.”	0.36	0.47
“Video games are isolating.”	0.36	< 0.01 ^c
“Video games can improve your wellbeing.”	0.08	0.11
“Video games are accessible.”	0.12	0.73
“Video games are harmful.”	0.10	0.12

^c Statistically significant findings.

C. Study I: Reasons for Adoption and Rejection

TABLE VIII. RELATIONS BETWEEN REASONS FOR ADOPTION AND AGE.

Questionnaire item	<i>p</i> - Age
“Other people wanted me to play them.”	0.88
“I expected playing video games would be interesting.”	0.59
“I believed video games could improve my life.”	0.03
“Video games would help me do something important to me.”	0.22
“I wanted others to know I play video games.”	0.76
“I would feel bad about myself if I didn't try playing video games.”	0.73
“I thought video games would be enjoyable.”	0.15
“I am required to play them (eg. by my job, school, research study).”	0.09
“Video games would be of value to me in my life.”	0.27
“Video games are fun to play.”	0.15
“I felt or feel pressured to play them.”	0.89
“It would look good to others if I played them.”	0.19

TABLE IX. RELATIONS BETWEEN REASONS FOR REJECTION AND AGE.

Questionnaire item	<i>p</i> - Age
“I do not have the time to play.”	0.46
“I do not think video games are suitable for people my age.”	0.98
“Video games are boring to play.”	0.64
“It would look bad to others if I played them.”	0.79
“I expect playing video games will be uninteresting.”	0.77
“There are no video games out there that I would enjoy.”	0.72
“I believe video games could negatively impact my life.”	0.09
“Other people do not want me to play them.”	0.24